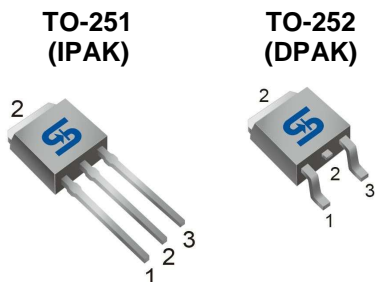


# TSM600N25E

## 250V N-Channel Power MOSFET



### Pin Definition:

1. Gate
2. Drain
3. Source

### Key Parameter Performance

Parameter	Value	Unit
$V_{DS}$	250	V
$R_{DS(on)}(max)$	0.6	$\Omega$
$Q_g$	8.4	nC

### Features

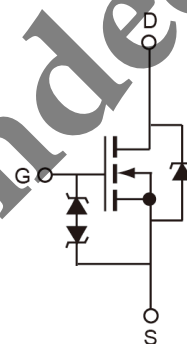
- 100% avalanche tested
- Improved ESD performance

### Ordering Information

Part No.	Package	Packing
TSM600N25ECH C5G	TO-251	75pcs / Tube
TSM600N25ECP ROG	TO-252	2.5kpcs / 13" Reel

**Note:** "G" denotes for Halogen- and Antimony-free as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds

### Block Diagram



N-Channel MOSFET

### Absolute Maximum Ratings

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	250	V
Gate-Source Voltage	$V_{GS}$	$\pm 30$	V
Continuous Drain Current	$I_D$	$T_C = 25^\circ C$	8
		$T_C = 100^\circ C$	3.6
Pulsed Drain Current <sup>(Note 1)</sup>	$I_{DM}$	32	A
Single Pulse Avalanche Energy <sup>(Note 2)</sup>	$E_{AS}$	147	mJ
Repetitive Avalanche Current <sup>(Note 1)</sup>	$I_{AR}$	8	A
Repetitive Avalanche Energy <sup>(Note 1)</sup>	$E_{AR}$	5.2	mJ
Power Dissipation @ $T_C = 25^\circ C$	$P_D$	52	W
Peak Diode Recovery <sup>(Note 3)</sup>	dv/dt	4.5	V/ns
Operating Junction Temperature	$T_J$	150	$^\circ C$
Storage Temperature Range	$T_{STG}$	-55 to +150	$^\circ C$

### Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Case	$R_{\theta JC}$	2.4	$^\circ C/W$
Thermal Resistance - Junction to Ambient	$R_{\theta JA}$	110	

### Electrical Specifications (T<sub>c</sub>=25°C unless otherwise noted)

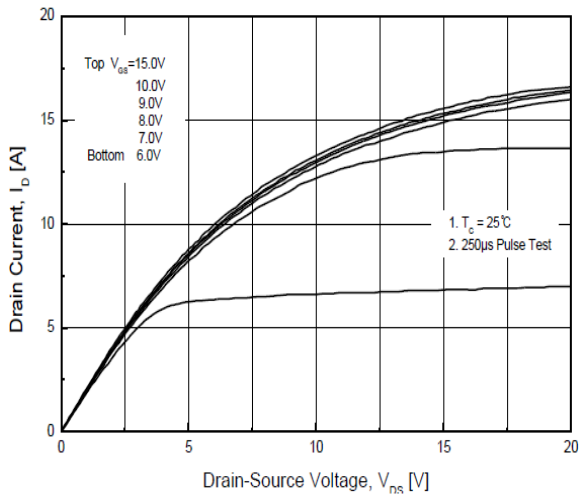
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA	BV <sub>DSS</sub>	250	--	--	V
Drain-Source On-State Resistance	V <sub>GS</sub> = 10V, I <sub>D</sub> = 4A	R <sub>DS(ON)</sub>	--	0.5	0.6	Ω
Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	V <sub>GS(TH)</sub>	3	--	5	V
Zero Gate Voltage Drain Current	V <sub>DS</sub> = 250V, V <sub>GS</sub> = 0V	I <sub>DSS</sub>	--	--	1	μA
	V <sub>DS</sub> = 200V, T <sub>c</sub> = 125°C		--	--	10	
Gate Body Leakage	V <sub>GS</sub> = ±30V, V <sub>DS</sub> = 0V	I <sub>GSS</sub>	--	--	±100	μA
Forward Transconductance <sup>(Note 4)</sup>	V <sub>DS</sub> = 30V, I <sub>D</sub> = 4A	g <sub>fs</sub>	--	7.5	--	S
<b>Dynamic</b>						
Total Gate Charge <sup>(Note 4,5)</sup>	V <sub>DS</sub> = 200V, I <sub>D</sub> = 8A, V <sub>GS</sub> = 10V	Q <sub>g</sub>	--	8.4	--	nC
Gate-Source Charge <sup>(Note 4,5)</sup>		Q <sub>gs</sub>	--	1.9	--	
Gate-Drain Charge <sup>(Note 4,5)</sup>		Q <sub>gd</sub>	--	4	--	
Input Capacitance	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1.0MHz	C <sub>iss</sub>	--	423	--	pF
Output Capacitance		C <sub>oss</sub>	--	74	--	
Reverse Transfer Capacitance		C <sub>rss</sub>	--	12	--	
<b>Switching</b>						
Turn-On Delay Time <sup>(Note 4,5)</sup>	V <sub>DD</sub> = 125V, I <sub>D</sub> = 8A, R <sub>GEN</sub> = 25Ω	t <sub>d(on)</sub>	--	14	--	ns
Turn-On Rise Time <sup>(Note 4,5)</sup>		t <sub>r</sub>	--	25	--	
Turn-Off Delay Time <sup>(Note 4,5)</sup>		t <sub>d(off)</sub>	--	30	--	
Turn-Off Fall Time <sup>(Note 4,5)</sup>		t <sub>f</sub>	--	14	--	
<b>Source-Drain Diode Ratings and Characteristic</b>						
Maximum Continuous Drain-Source Diode Forward Current		I <sub>S</sub>	--	--	8	A
Maximum Pulse Drain-Source Diode Forward Current		I <sub>SM</sub>	--	--	32	A
Diode-Source Forward Voltage	V <sub>GS</sub> = 0V, I <sub>S</sub> = 8A	V <sub>SD</sub>	--	--	1.5	V
Reverse Recovery Time <sup>(Note 4)</sup>	V <sub>GS</sub> = 0V, I <sub>S</sub> = 8A di/dt = 100A/μs	t <sub>rr</sub>	--	157	--	ns
Reverse Recovery Charge <sup>(Note 4)</sup>		Q <sub>rr</sub>	--	0.6	--	μC

#### Note:

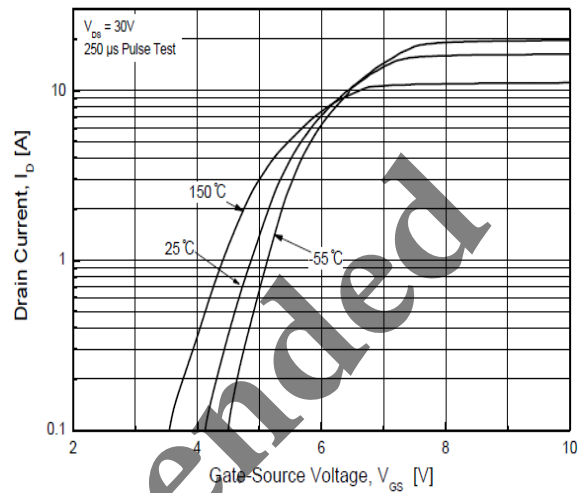
- Pulse width limited by safe operating area
- L=3.68mH, I<sub>AS</sub> =8A, V<sub>DD</sub> = 50V, R<sub>G</sub> = 25Ω, Starting T<sub>J</sub> = 25°C
- I<sub>SD</sub> ≤8A, di/dt ≤ 200A/μs, V<sub>DD</sub> ≤ BV<sub>DS</sub>, Starting T<sub>J</sub>=25°C
- Pulse test: pulse width ≤300μs, duty cycle ≤2%
- Switching time is essentially independent of operating temperature.

### Electrical Characteristics Curves

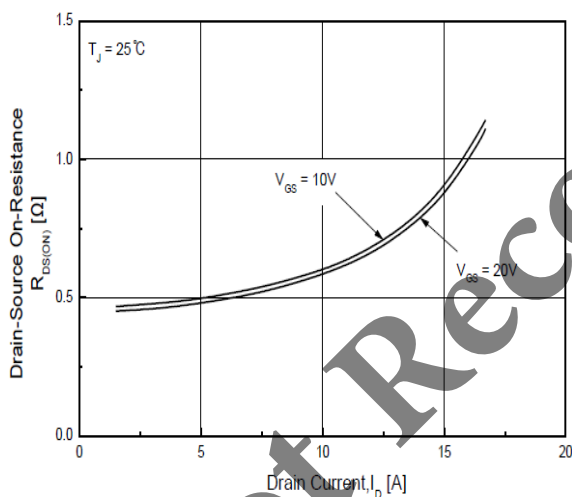
**Output Characteristics**



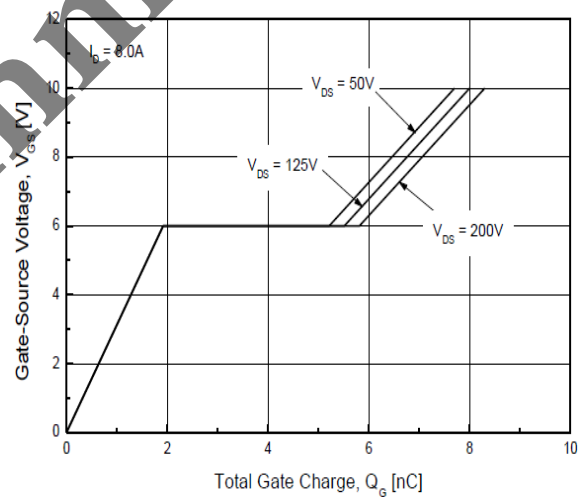
**Transfer Characteristics**



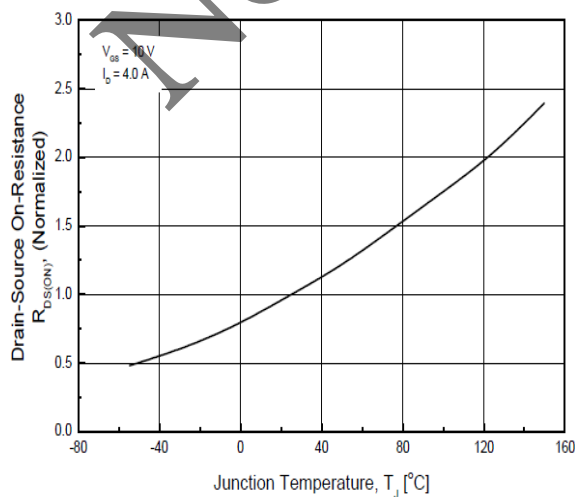
**On-Resistance vs. Drain Current**



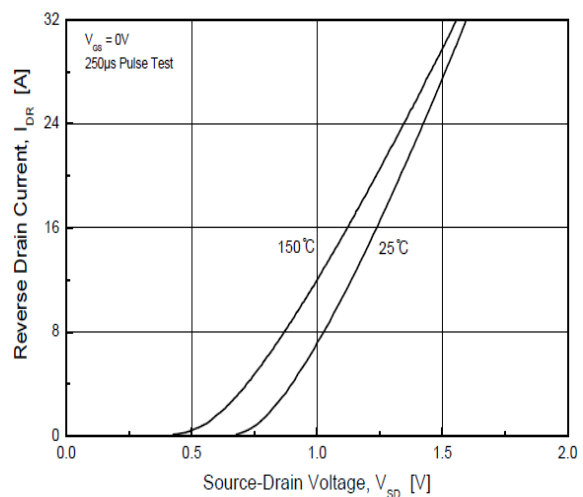
**Gate Charge**



**On-Resistance vs. Junction Temperature**

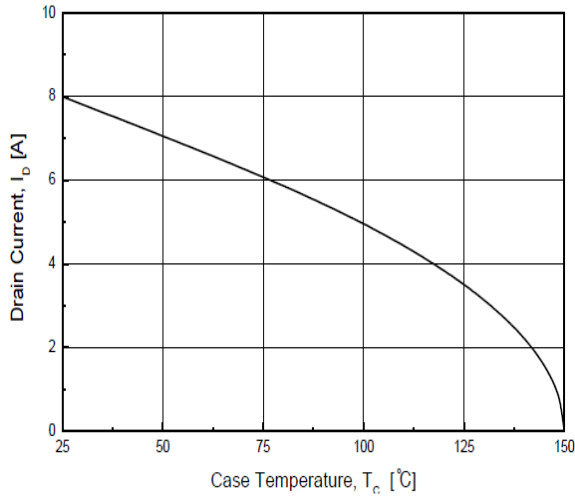


**Source-Drain Diode Forward Voltage**

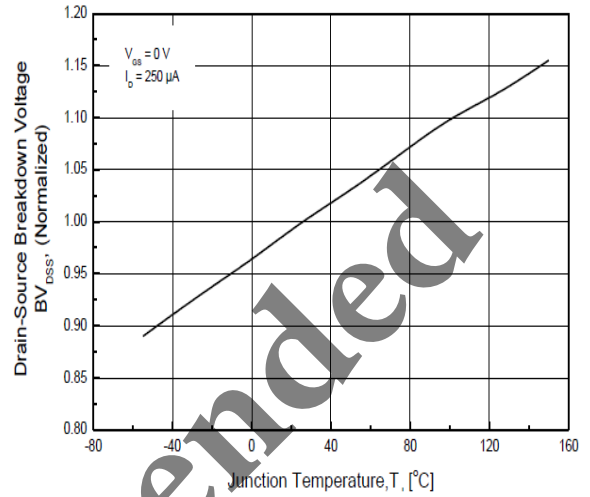


### Electrical Characteristics Curves

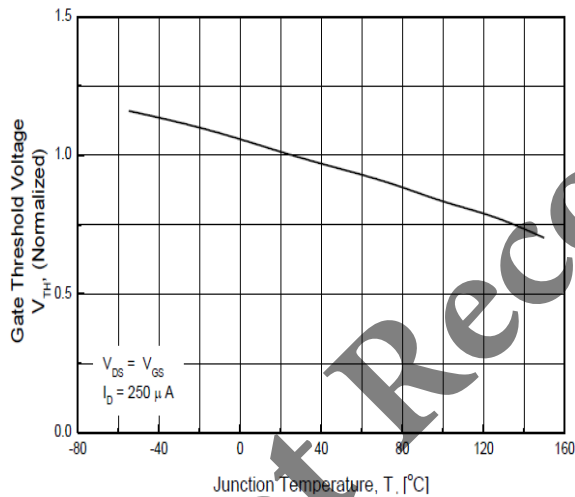
**Drain Current vs. Case Temperature**



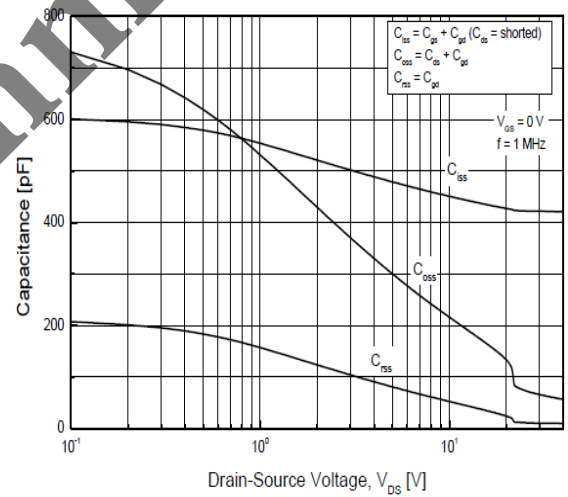
**$BV_{DSS}$  vs. Junction Temperature**



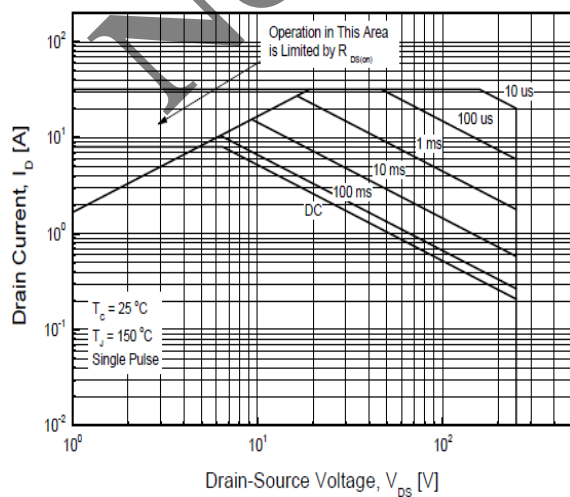
**$V_{TH}$  vs. Junction Temperature**



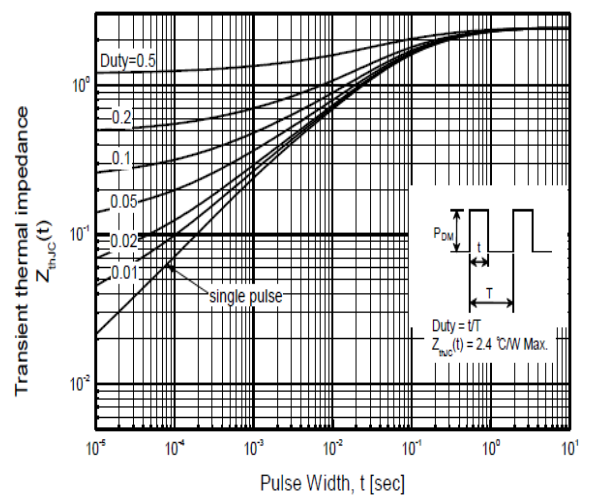
**Capacitance vs. Drain-Source Voltage**



**Maximum Safe Operating Area**

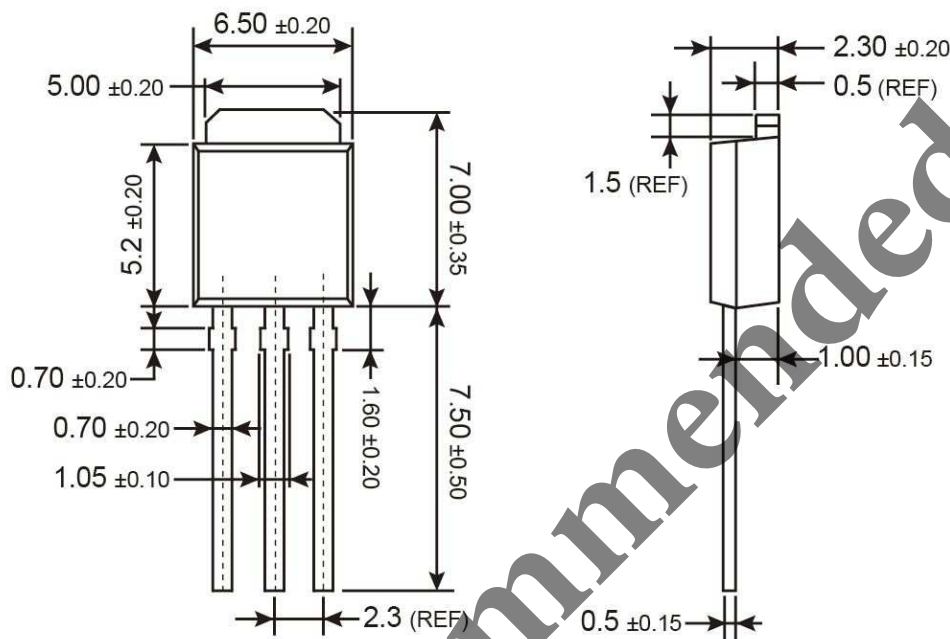


**Transient Thermal Impedance**



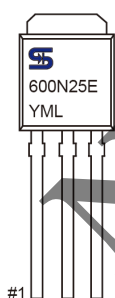


**TO-251 Mechanical Drawing**



Unit: Millimeters

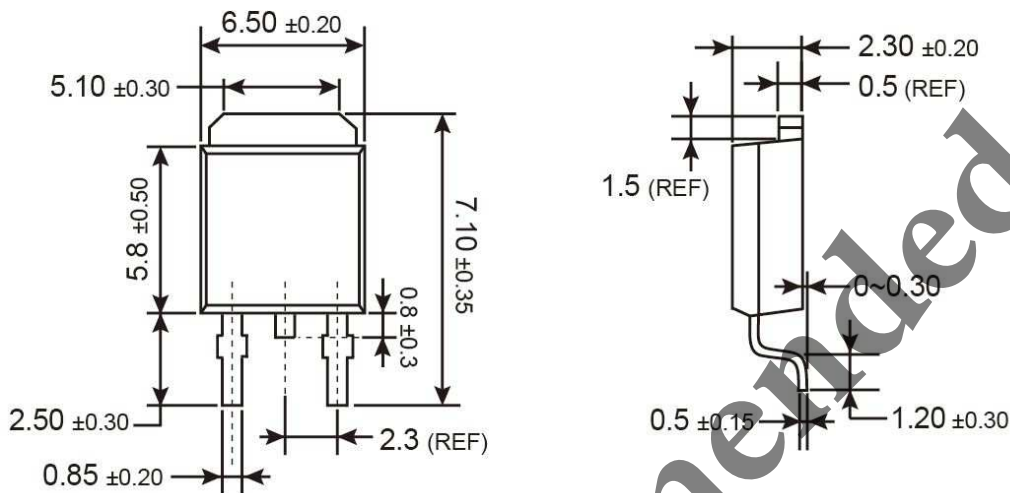
**Marking Diagram**



- Y** = Year Code
- M** = Month Code for Halogen Free Product  
(**O**=Jan, **P**=Feb, **Q**=Mar, **R**=Apr, **S**=May, **T**=Jun, **U**=Jul, **V**=Aug, **W**=Sep, **X**=Oct, **Y**=Nov, **Z**=Dec)
- L** = Lot Code

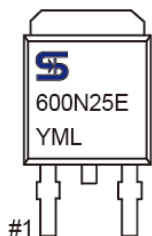


**TO-252 Mechanical Drawing**



Unit: Millimeters

**Marking Diagram**



- Y** = Year Code
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 (O=Jan, P=Feb, Q=Mar, R=Apl, S=May, T=Jun, U=Jul, V=Aug, W=Sep, X=Oct, Y=Nov, Z=Dec)
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Not Recommended

**Not Recommended**

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